Title: Developing GIS Too to Identify Critical Areas for Drinking Water Supply during Dry Season in Dinajpur District

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ABSTRACT

Huge drawdown of the groundwater table is one of the environmental hazards due to large scale groundwater withdrawal during dry period. Hand tube wells (HTWs) and shallow tube wells (STWs) operated under gravitational force, are the main supplier of drinking water in rural areas may be dry out due to excessive drawdown. This worst condition of drinking water supply in rural areas has been found in the north-west part of Bangladesh, namely in Dinajpur district. Therefore, this study was conducted to identify the areas within Dinajpur district where groundwater goes under a certain level of safe yield from which water cannot be withdrawn with hand tube wells. A maximum of 6m depth to groundwater table from ground surface has been considered as the safe yield limit to ensure the drinking water supply in the study area through HTWs and STWs with full operational efficiency.

The existing groundwater table of the study area has been analyzed from different groundwater observation wells of BWDB for the last available nine years' data. Three interpolation methods available in GIS namely, inverse distance weighted (IDW), Thin-plate Spline and Kriging have been tested to construct groundwater level surface from the observation well data. Among this three interpolation methods, Kriging with ordinary linear semi-variance model has given the most accurate result when a few number of groundwater observation well data available. This study showed that the most of the critical areas lie in Biral, Dinajpur Sadar, Kaharole and Khansama upazilas of Dinajpur district where annual groundwater level fluctuation is in the range of 4.0m to 11.0m. Bochagonj, Birganj and Chirirbandar upazilas of Dinajpur district have been found as

negligible critical areas where annual groundwater level fluctuation varies from 1.5m to 6.5m. This study also developed some customized tools using Avenue scripts (built in object-oriented programming language) in ESRI's ArcView GIS 3.2 software with Spatial Analyst 2.0 extension to make the delineation of water scarce areas easy for different time on the basis of available data.